UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,433	09/26/2006	Peter Healey	36-2017	2937

23117 7590 02/23/2010
NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER	
MIAN, OMER S	

ART UNIT	PAPER NUMBER
2461	

MAIL DATE	DELIVERY MODE
02/23/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/594,433	HEALEY ET AL.
	Examiner	Art Unit
	OMER MIAN	2461

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ ~~Information Disclosure Statement(s) (PTO/SB/08)~~ Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 24 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 24 recite limitation that has already defined in claim 22 lines 5-7 ("wherein said …one another") which it depends on.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 30-31 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by DAKIN (US 4885462).

Regarding claim 30, DAKIN discloses a *sensing system for sensing the position of a moving vehicle, the sensing system* *comprising:*

a guide track for guiding the movement of the vehicle (DAKIN: col. 3 lines 35-41, rail track for guiding movement of a vehicle)*;*

an optical channel extending along the guide track (DAKIN: col. 3 lines 3-41, and Fig. 1, optical fiber extending to the track)*; and,*

monitoring apparatus coupled to the optical channel(DAKIN: Fig. 1 col. 2 lines 8-36, monitoring detectors and apparatus connected to the optical fiber), *wherein the optical fiber is mechanically coupled to the guide track such that movement of the vehicle causes a moving disturbance* *to be sensed by a sensing optical signal propagating* *along the optical fiber* (DAKIN: Fig. 1 col. 2 lines 8-36, col. 3 lines 3-41, fiber is mechanically coupled to guide track such that movement of the vehicle causes disturbance and optical beam is used to sense that disturbance/influence),

the monitoring apparatus being configured to

(i) detect a said sensing optical signal from the optical fiber, wherein said sensing light signal is indicative of the moving disturbance (DAKIN: Fig. 1, col. 1 line 43-60 and col. 2 line 3-36, detection of light indicative of parameter acting at a point),

(ii) evaluate at least one temporal characteristic of the sensing optical signal (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-36, evaluating rate of change of phase of the signal), *and*

(iii) in dependence on the evaluated temporal characteristic, determine an indication of the position of the moving disturbance along the optical fiber so that the position of the vehicle along the track can be sensed (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41, rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track).

Regarding claim 31, DAKIN discloses a *sensing method of sensing the position of a vehicle moving along a guide track,*

wherein there is provided an optical channel extending along the guide track (DAKIN: col. 3 lines 3-41, and Fig. 1, optical fiber extending to the track), *and*

monitoring apparatus coupled to the optical channel, the optical channel being mechanically coupled to guide track such that movement of the vehicle causes a moving disturbance <u>*to be sensed by a sensing optical signal propagating*</u> *along the optical fiber* (DAKIN: Fig. 1 col. 2 lines 8-36, col. 3 lines 3-41, fiber is mechanically coupled to guide track such that movement of the vehicle causes disturbance and optical beam is used to sense that disturbance/influence), *the method* <u>*comprising*</u>*:*

(i) detecting a light signal from the optical <u>*fiber,*</u> *indicative of the moving disturbance* (DAKIN: Fig. 1, col. 1 line 43-60 and col. 2 line 3-36, detection of light indicative of parameter acting at a point),

(ii) evaluating at least one temporal characteristic of the light signal (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-36, evaluating rate of change of phase of the signal), *and*

(iii) in dependence on the evaluated temporal characteristic, determining an indication of the position of the moving disturbance along the optical fiber(DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41, rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track); *and*

(iv) inferring the position of the vehicle from the position of the disturbance along the optical channel (DAKIN: Fig. 1, col. 1 line 1-60 and col. 2 line 3-58, col. 3 lines 3-41,

rate of change of phase is evaluated to locate the position of the disturbance and hence the position of vehicle on the track).

Regarding claim 33, DAKIN discloses method, *wherein the sensing optical signal comprises a pair of signal copies* (DAKIN: col. 2 lines 58-col. 3 line 2, pair of signal copies), *and wherein phase differences in said pair of signal copies are combined in order to form an interference signal* (DAKIN: col. 2 line 6-col. 3 line 17, interference is calculated from the phase shift in the said pair of signals), *so that time-varying phase changes in said optical fiber brought about by said disturbance result in a phase difference between the signal pairs* (DAKIN: col. 2 line 6-col. 3 line 17, col. 1, lines 43-60, time-varying phase changes in said optical fiber formed by disturbance result in the phase difference), *which is converted into an amplitude change in said interference signal.*

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-2, 8-18, 22, 24-29, and 32 rejected under 35 U.S.C. 103(a) as being unpatentable over CRAWFORD et al (US 5355208) in view of LANGE et al (US 2003/0103211).

Regarding claim 1, CRAWFORD discloses *method of evaluating the position of a time-varying disturbance on a transmission link, the method comprising:*

copying, at least in part, an output signal from a source, such that there is a pair of signal copies (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, light source is split into two copies of signal);

transmitting the pair of signal copies onto the transmission link (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, the pair of copies light travels on optical fiber loop);

receiving in a return direction (CRAWFORD: col. 8, lines 5-31, receiving beams returned with a direction)*from the transmission link return signals comprising components comprising at least partially returned copies of said signal copies previously transmitted on said transmission link*(CRAWFORD: col. 8, lines 5-31, receiving beams returned with a direction)*, wherein at least one of said components has suffered a phase change* (CRAWFORD: col. 8 lines 25-31, phase relationship modified)

caused by said time-varying (CRAWFORD: col. 3. lines 21-26, time varying impact) *disturbance* (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, the pair of copies light travels on optical fiber loop);

combining the received returned signal copies of a transmitted pair so as to produce a combination signal (CRAWFORD: col. 8, lines 5-31, returned beams are combined and combine the signal); and,

using a temporal characteristic in the combination signal to evaluate the position of the time-varying disturbance on the transmission link (CRAWFORD: col. 8, lines 58-65 and Fig. 3, the time of the combination signal is utilized to evaluate the position of the disturbance).

wherein the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies (CRAWFORD: col. 8 line 58-col. 9 line 30, time of arrival of the signal copies is used to determine the position of disturbance).

CRAWFORD does not explicitly disclose that the components are *backscattered components.*

However, LANGE expressly discloses that the components are *backscattered components* (LANGE: Abstract and ¶28, reflected and scattered light signals are collected).

A person of ordinary skill in the art working with the invention CRAWFORD would have been motivated to use the technique of LANGE as it provides a design of using one light source for all production of light and conserve hardware structure requirement.

(LANGE: Fig. 1) Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify CRAWFORD by LANGE in order to make the invention more economical by using less equipment and/or power.

Regarding claim 2, CRAWFORD modified by LANGE, hereinafter CL, discloses method, *wherein the temporal characteristic includes the time at which a disturbance feature occurs in the combination signal* (CRAWFORD: Fig. 3 and col. 9 lines 1-30, time at which the disturbance is occurred determined).

Regarding claim 8, CL discloses method, *wherein the signal copies are carried along a common transmission medium of the optical transmission link* (LANGE: Fig. 1 and ¶43, signal is carried over the common medium of optical fiber).

Regarding claim 9, CL discloses method, *wherein signal copies of a pair travel along the transmission link with a differential delay relative to one another* (LANGE: ¶27 and ¶43 where phase delay is added between the beams of light).

Regarding claim 10, CL discloses method, *wherein the differential delay is caused at an unbalanced interferometer coupled to an optical source, the interferometer having a first path and a second path, the transit time of the first path being longer than that of the second path, signal copies of a pair being caused to travel along a different respective path to one another* (LANGE: Fig. 4 and Fig. 1, ¶27 and ¶43 modulation performed to delay one of the signal and paths are different for the different).

Regarding claim 11, CL discloses method, *wherein the interferometer has a first coupling stage which is coupled to the source, the coupling stage being arranged to channel one portion of the incoming radiation intensity from the source along one path, and another portion of the incoming radiation intensity along the other path, so as to form the first and second signal copies* (LANGE: ¶27 and ¶43, beam divided into two parts).

Regarding claim 12, CL discloses a method as claimed in claim 11, *wherein the interferometer has a second coupling stage for combining radiation from the first and second paths, and for coupling the combined radiation to the common communications link* (LANGE: Fig. 1 and ¶27-30 and ¶43, beam divided into two parts and rejoined at the coupler).

Regarding claim 13, CL discloses a method, *wherein the signals returned from the second location are each channeled along the first and second paths by a second coupling stage, and wherein the so channeled signals are subsequently combined at the first coupling stage* (LANGE: Fig. 1 and ¶27-30 and ¶43, beam divided into two parts and rejoined at the coupler).

Regarding claim 14, CL discloses a method, *wherein the signal copies of a pair are delayed relative to one another at a first location, and wherein at disturbance is*

detectable at a second location remote from the first location (LANGE: Fig. 1 and ¶27-30 and ¶43, beam divided into two parts and rejoined at the coupler).

Regarding claim 15, CL discloses *a method wherein each of the signal copies of a pair is disturbed by a detected disturbance* (LANGE: ¶23 and ¶62, break or inconsistency which affect the pair of beams is detected).

Regarding claim 16, CL discloses *method wherein the signal copies of a pair travel in the same* <u>*direction*</u> *along the transmission link* (LANGE: Fig. 1 and ¶27-31, signal travels in the same direction in the optical link and CRAWFORD: col. 8, lines 1-67, and Fig. 3, atleast a pair of signal copies are in same directions).

Regarding claim 17, CL discloses method, *wherein the output signals have an average phase-coherence time associated therewith of less than 1 pico seconds* (LANGE: ¶30, the coherence length is several hundreds of microns).

Regarding claim 18 CL discloses a method as claimed in claim 17, *wherein the signal copies of a pair have a differential delay time associated therewith* (LANGE: ¶27-30 delays are introduced between the signals), *the delay time being greater than the average phase-coherence time* (LANGE: ¶31, delay path length is significantly shorter than the delay path length).

CL does not explicitly disclose that *delay length is greater by a factor of at least 1000.*

However, it is generally considered to be within the ordinary skill in the art to adjust, vary, select or optimize the numerical parameters or values of any system absent a showing of criticality in a particular recited value. The burden of showing criticality is on Appellant. *In re Mason*, 87 F.2d 370, 32 USPQ 242 (CCPA 1937); *Marconi Wireless Telegraph Co. v. U.S.*, 320 U.S. 1, 57 USPQ 471 (1943); *In re Seather,* 492 F.2d 849, 181 USPQ 233 (CCPA 1945).

Regarding claim 22, CRAWFORD discloses an apparatus *evaluating the position of a time-varying disturbance on a transmission link, the method* <u>*comprising:*</u>

means for copying, at least in part, an output signal from a source, such that there is a pair of signal copies (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, light source is split into two copies of signal);

means for transmitting the signal copies onto the transmission link (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, the pair of copies light travels on optical fiber loop);

means receiving <u>*in a return direction*</u> (CRAWFORD: col. 8, lines 5-31, receiving beams returned with a direction)*from the transmission link* <u>*return signals comprising components comprising*</u> *at least partially returned* <u>*copies of said*</u> *signal copies previously transmitted* <u>*on said transmission link*</u>(CRAWFORD: col. 8, lines 5-31, receiving beams returned with a direction)<u>, *wherein at least one of said components has suffered a phase change*</u> (CRAWFORD: col. 8 lines 25-31, phase relationship modified) <u>*caused by said time-varying*</u> (CRAWFORD: col. 3. lines 21-26, time varying impact)

<u>*disturbance*</u> (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, the pair of copies light travels on optical fiber loop);

combining the received <u>*returned*</u> *signal copies of a transmitted pair so as to produce a combination signal* (CRAWFORD: col. 8, lines 5-31, returned beams are combined and combine the signal); and,

monitoring means for monitoring the combinations signal as a function of time (CRAWFORD: col. 8, lines 55-68, combination are monitored with respect to time).

<u>*wherein said monitoring means monitors a temporal characteristic in the combination signal to evaluate the position of the time-varying disturbance on the transmission link*</u> (CRAWFORD: col. 8, lines 58-65 and Fig. 3, the time of the combination signal is utilized to evaluate the position of the disturbance).

<u>*wherein the position of the disturbance is determined from the time of the return of said phase-modulated components of said returned signal copies*</u> (CRAWFORD: col. 8 line 58-col. 9 line 30, time of arrival of the signal copies is used to determine the position of disturbance).

CRAWFORD does not explicitly disclose that the components are *backscattered components* and *wherein said signal copies of a pair of travel along the transmission link with a differential delay relative to one another;*

However, LANGE expressly discloses that the components are *backscattered components* (LANGE: Abstract and ¶28, reflected and scattered light signals are collected). and *wherein said signal copies of a pair of travel along the transmission link*

with a differential delay relative to one another(LANGE: ¶36, at least one copy is phase shifted with respect to other and hence time shifted)*;*

A person of ordinary skill in the art working with the invention CRAWFORD would have been motivated to use the technique of LANGE as it provides a design of using one light source for all production of light and conserve hardware structure requirement. (LANGE: Fig. 1) Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify CRAWFORD by LANGE in order to make the invention more economical by using less equipment and/or power.

Regarding claim 24, CL discloses an apparatus *wherein delay means is provided for delaying the signal copies of a pair relative to one another* (LANGE: ¶27 and ¶43 where phase shift and hence a delay is added between the beams of light).

Regarding claim 25, CL discloses an apparatus *wherein delay means the delay means is provided by an interferometer stage, the interferometer stage having first and second transmission legs* (CRAWFORD: col. 8 lines 1-67, and LANGE: ¶43 and ¶27-31 and Fig. 1, two transmission legs exist) *and coupling means for coupling to or from the first and second legs* (LANGE: fig. 1 and ¶27-31 coupler is connected to the legs)*, and wherein the means for copying output signals and the means for combining the received signal copies are formed in common by the coupling means* (LANGE: ¶27 and Fig. 1, coupler and Y-junction is in the same sensor system).

Regarding claim 26, CRAWFORD discloses a monitoring stations for *monitoring a transmission link, the monitoring station comprising:*

a source for generating output signals (CRAWFORD: Fig. 1 and Fig. 2, and col. 4 lines 25-42, col. 8 line 2-14, light source)*;*

an interferometer stage for copying at least in part the output signals from the source such that for each output signal, there is a pair of signal copies(CRAWFORD: Fig. 5 lines 14-19, interferometer stage for splitting)*;*

an output for launching the signal copies onto the transmission link CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, the pair of copies light travels on optical fiber loop)*; and,*

a processor circuit(CRAWFORD: Fig. 1, computer 29 along with other processor circuits)

wherein the interferometer stage is arranged to receive signal copies returned by a process from the link and to combine the signal copies so as to produce an interference signal(CRAWFORD: col. 8, lines 5-31, returned beams are combined and combine the signal), *<u>wherein at least one of the said signal copies has suffered a phase change</u>* (CRAWFORD: col. 8, lines 19-31, phase of the beam changed)<u>,</u> *and*

wherein the processor circuit is arranged to store the interference signal in association with an indication of a temporal characteristic of the return signal(CRAWFORD: col. 8, lines 1-col. 9 line 30, detector stores the interference signal

and parts of processor circuit as cited above in this claim, store the temporal characteristic of the return signal).

wherein said phase change is caused by a time-varying disturbance(CRAWFORD: col. 3. lines 21-26, time varying impact and col. 8, lines 19-31, phase of the beam changed)*, said interference signal stored in association with an indication of a temporal characteristic of the return signal enables the position of the disturbance to be determined from the time of the return of the phase-modulated components of said return signal copies* (CRAWFORD: col. 8 line 58-col. 9 line 30, time of arrival of the signal copies is used to determine the position of disturbance)

CRAWFORD does not explicitly disclose that the *process is distributed backscattering process*.

However, BRYCE expressly discloses that the process is *distributed backscattering process* (BRYCE: col. 7 lines 9-23, backscattered from distributed targets is produced).

A person of ordinary skill in the art working with the invention of LANGE would have been motive to use the technique of BRYCE of distributed backscattering as it provides ability of implementation over wide range of wavelengths increasing the applicability of the invention (BRYCE: col. 2-col.3). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of LANGE and BRYCE in order to increase industrial applicability of the invention.

CRAWFORD does not explicitly disclose that the components are *backscattered components*.

However, LANGE expressly discloses that the components are *backscattered components* (LANGE: Abstract and ¶28, reflected and scattered light signals are collected).

A person of ordinary skill in the art working with the invention CRAWFORD would have been motivated to use the technique of LANGE as it provides a design of using one light source for all production of light and conserve hardware structure requirement. (LANGE: Fig. 1) Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify CRAWFORD by LANGE in order to make the invention more economical by using less equipment and/or power.

Regarding claim 27, CL *discloses monitoring station, wherein the interference signal is a time-distributed signal which varies with time, and wherein a temporal characteristic is the time variation of the return signal* (CRAWFORD: col. 8 lines 1-67, time-distributed signal and time variation of the return signal is analyzed).

Regarding claim 28, CL *discloses monitoring station, wherein the interference signal is a time-distributed signal, and the processor circuit is arranged to sample the interference signal at intervals* (LANGE: Fig. 4, and Fig. 1, ¶62 and ¶53, sampled at a frequency and processed)*, and to store the samples in association with a respective return time for each sample* (LANGE: Fig 1, ¶53 and ¶43, where a delay is induced and a memory is present).

Regarding claim 29, CL *discloses monitoring station, wherein the source is an optical pulse source* (CRAWFORD: col. 8 lines 1-31, light source is a pulse light source).

Regarding claim 32, CRAWFORD discloses a *method of monitoring a transmission link to detect a physical disturbance of the link, the method comprising:*

copying, at least in part, an output signal from a source, such that there is a pair of signal copies (CRAWFORD: Fig. 1-2 and col. 7, line 55-col. 8 line 31, light source is split into two copies of signal);

transmitting the signal copies onto *a common communications link* (¶32, light travels on optical links);

receiving in a return direction from the transmission link return signals comprising components comprising at least partially reflected copies previously transmitted <u>on said transmission link, wherein at least one of said backscattered components has suffered a phase change caused by a time-variation of said physical disturbance</u> (Fig. 1 and ¶28, light is reflected and returned);

combining the received <u>returned</u> signal copies of a transmitted pair so as to produce a combination signal (CRAWFORD: col. 8, lines 5-31, returned beams are combined and combine the signal); and,

monitoring the combination signal to detect a disturbance feature in the combination signal, from which disturbance feature the presence of a disturbance can

be inferred (CRAWFORD: col. 8, lines 58-65 and Fig. 3, the time of the combination signal is utilized to evaluate the position of the disturbance)*; and*

from a temporal characteristic in the combination signal to evaluate the position of the disturbance on the communications link (Fig. 3 and 6, ¶23 and ¶62, detection is performed of the received signal at a frequency).

wherein the position of the disturbance is determined from the time of return of phase-modulated backscattered components of said returned signal copies (CRAWFORD: col. 8 line 58-col. 9 line 30, time of arrival of the signal copies is used to determine the position of disturbance)

CRAWFORD does not explicitly disclose that the components are *backscattered components*, *means for delaying one of said signal copies in said pair of signal copies relative to another one of said signal copies in said pair of signal copies; wherein said signal copies of a pair of travel along the transmission link with a differential delay relative to one another;*

However, LANGE expressly discloses that the components and the copies are *backscattered components* (LANGE: Abstract and ¶28, reflected and scattered light signals are collected), *means for delaying one of said signal copies in said pair of signal copies relative to another one of said signal copies in said pair of signal copies*(LANGE: ¶36, at least one copy is phase shifted with respect to other and hence time shifted using phase modulator); and *wherein said signal copies of a pair of travel along the transmission link with a differential delay relative to one another*(LANGE: ¶36, at least one copy is phase shifted with respect to other and hence time shifted)*;*

A person of ordinary skill in the art working with the invention CRAWFORD would have been motivated to use the technique of LANGE as it provides a design of using one light source for all production of light and conserve hardware structure requirement. (LANGE: Fig. 1) Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify CRAWFORD by LANGE in order to make the invention more economical by using less equipment and/or power.

7. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over CL as applied to claim 1 above, further in view of BRYCE et al (US 7397568).

Regarding claim 3, LANGE discloses method, *wherein signal copies are returned as the signal copies travel along the transmission link by a process of backscattering* (LANGE: Abstract and ¶28, signals are reflected and returned)

CL does not explicitly disclose that the returning is *by a process of distributed backscattering.*

However, BRYCE expressly discloses that the returning is *by a process of distributed backscattering* (BRYCE: col. 7 lines 9-23, backscattered from distributed targets is produced).

A person of ordinary skill in the art working with the invention of CL would have been motive to use the technique of BRYCE of distributed backscattering as it provides ability of implementation over wide range of wavelengths increasing the applicability of

the invention (BRYCE: col. 2-col.3). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of CL and BRYCE in order to increase industrial applicability of the invention.

Regarding claim 4, the combined teachings of CL and BRYCE, hereinafter CLB, discloses method, wherein the source is configured to produce output signals having the form of optical pulses, each optical pulse giving rise to a combination signal that is distributed over time as the pulse travels along the transmission link (CRAWFORD: col. 8 lines 1-31, constructive interference occurs and LANGE: Fig. 4 and ¶29, where light source generate optical pulse, where combined signal is risen (LANGE: Fig. 3)).

8. Claims 5-7 rejected under 35 U.S.C. 103(a) as being unpatentable over CL as applied to claim 1 above, further in view of REINGANG et al (US 7110677).

Regarding claim 5, CL discloses method, wherein the combination signal is sampled at temporal positions (LANGE: ¶62 and Fig. 1, the detector is sampling at a frequency.)

CL does not expressly disclose that sampling is at a first set of spaced apart temporal positions and at a second set of temporal position, and a wherein the first and second sampled sets are compared in a comparison step

However, REINGANG expressly discloses that sampling is at a first set of spaced apart temporal positions and at a second set of temporal position, and a wherein the first and second sampled sets are compared in a comparison step

(REINGANG: col. 10 line 65-col. 11 line 13, optical signals are detected by sampling based on different delay and hence different sampling sets and the sampled signals are compared).

A person of ordinary skill in the art at working with the invention of CL would be motivated to use the method of detecting of interleaved optical signals of REINGANG as it provides improved efficiency of detecting signals is achieved as they signals do not overlap (REINGANG: col. 1 lines 55-60). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the inventions of CL and REINGANG in order to increase industrial applicability of the invention.

Regarding claim 6, the combined teachings of CL and REINGANG, hereinafter CLR, discloses method, wherein the temporal positions of the first and second sets are interleaved (REINGANG: col. 10 lines 65- col. 11 line 13, the positions are interleaved).

Regarding claim 7, CLR discloses method, wherein the comparison step involves generating a set of data which is at least in part dependent on the difference between the first and second sets (CRAWFORD: col. 8 lines 1-31 and LANGE: ¶27-29 where the difference in the two received signals is the result of the comparison).

9. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over CL as applied to claim 1 above, further in view of DAKIN et al (US 4885462).

Regarding claim 19, CL discloses *a method as claimed in claim 1 above where an optical fiber is extending, the optical fiber being arranged such that movement of the vehicle causes a disturbance along the optical channel*(CRAWFORD: col. 1 lines 25-45, a vehicle causes a disturbance).

However, DAKIN discloses that the optical fiber extending *along a guide track, the guide track being arranged to guide the movement of a vehicle* (DAKIN: col. 3 line 35-40, vehicle movement is along a rail).

A person of ordinary skill in the art working with the invention of CL would have been motivated of using the technique taught by DAKIN of using disturbances to control and guide vehicle as it provides an industrial application of the invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to combine the inventions of CL and DAKIN, hereinafter CLD, in order to increase applicability and consumer market of the invention.

Regarding claim 21, CLD discloses method as in claim 20 above *wherein the guide track has the form of one or more rails for guiding the movement of a train* (DAKIN: col. 3 line 35-40, vehicle movement is along a rail).

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over CLD as applied to claim 19 above, further in view of DALLAIRE et al (US 4855915).

Regarding claim 20, CLD, discloses a method, *wherein the path of the optical channel crosses the track.*

CLD does not expressly disclose that the crossing is *at intervals*

However, DALLAIRE discloses that the crossing is *at intervals* (DALLAIRE: col. 1 line 40 – col. 2 line 64, channels cross the path of the vehicle at intervals).

A person of ordinary skill in the art working with the invention of CLD would have been motivated of using the technique taught by DALLAIRE of using disturbances to control and guide vehicle as it provides a way to detect any accidents or interruption in the travel of the vehicle as at intervals can always be predetermined. Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to combine the inventions of CLD and DALLAIRE, hereinafter CLDD, in order to increase safety of the vehicle travel in case of an emergency.

11. Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over CL as applied to claim 22 above, further in view of SORIN et al (US 5982791).

Regarding claim 23, CL discloses an apparatus as set forth in claim 22 above where monitoring means is disclosed (Fig. 3 and Fig. 4, and ¶23, ¶62, where signal is monitored).

CL does not explicitly disclose *monitoring means includes a display device for displaying the combination signals as a function of time.*

However, SORIN discloses *monitoring means includes a display device for displaying the combination signals as a function of time* (SORIN: col. 3, lines 13 - 27, spectrum analyzer is used to monitor the optical signal).

A person of ordinary skill in the art working with the invention of CL would have been motivated of using the technique taught by SORIN as it provides more real-time and dynamic adjustment of back-reflecting the optical carrier (SORIN: col. 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time of inventions to combine the inventions of CL and SORIN in order to increase applicability and consumer market of the invention.

Response to Arguments

12. Applicant's arguments with respect to claim 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMER MIAN whose telephone number is (571)270-7524. The examiner can normally be reached on Monday-Thursday 8:30am-6pm and Fridays 8:30am-12:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, HUY VU can be reached on (571)272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/O. M./

Examiner, Art Unit 2461
/Huy D Vu/
Supervisory Patent Examiner, Art Unit 2461